

A BOTANICAL TOUR TO PANGI & TRILOKNATH IN THE UPPER CHENAB¹

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(With two plates and a text-figure)

The paper presents an account of exploration of a remote N. W. Himalayan valley along a pilgrimage route in the intersection of Lahul and Pangli valleys. Apart from highlighting its main features of vegetation, botanical wealth and physiography, the paper also enumerates a list of 235 species under 54 families, particularly collected in the upper Chenab, with short ecological notes including 62 species hitherto unreported from the Lahul valley.

INTRODUCTION

Most of the approachable river valleys in the Western Himalaya have more than one religious centre visited by people from time immemorial inspite of natural hazards and physical discomforts. One such famous shrine of Triloknath (also spelt Trilokinath) is situated in the upper Chenab valley. The easiest route to reach the area is through the picturesque Lahul valley after crossing the Rohtang Pass (3980 m). During July and August, 1971 we undertook an exploration tour to the upper Chenab for collecting specimens for information on the Botany of the area hitherto little known through published literature. With the inclusion of the Pangli valley as an area for the conservation of wild life, the exploration report of this botanically interesting area was felt to be of considerable importance.

Chenab valley in Lahul is known as 'Manchat' or low land or low valley (Aitchison 1868) and locally this is also called as Patan

valley. It is the most thickly populated area in Lahul with extensive cultivated lands and preserves, dense forested areas and herbaceous greeneries (Randhawa 1959) unlike any other part of the dry and desolate Lahul & Spiti valleys. The journey along the valley to Triloknath and further west to Udaipur, presents soothing landscapes of the winding Chenab with green villages and multicoloured network of cultivated terraced fields. The beauty of the valley is further enhanced by the dark green *Pinus wallichiana* and *Picea smithiana* on the north facing slopes and with contrasting yellowish green *Juniperus polycarpus* covering the opposite slopes of the magnificent mountains standing on both sides of the river valley. After a bleak and rugged mountainous feature of the Chandra valleys a journey along the Chenab brings joyous relief to trekkers and botanical explorers.

TRILOKNATH

Triloknath is situated at a distance of about 42 kilometres downstream along the Chandra-Bhaga or Chenab from Tandi. Only very recently the Chenab valley up to Udaipur has been connected by motorable road where

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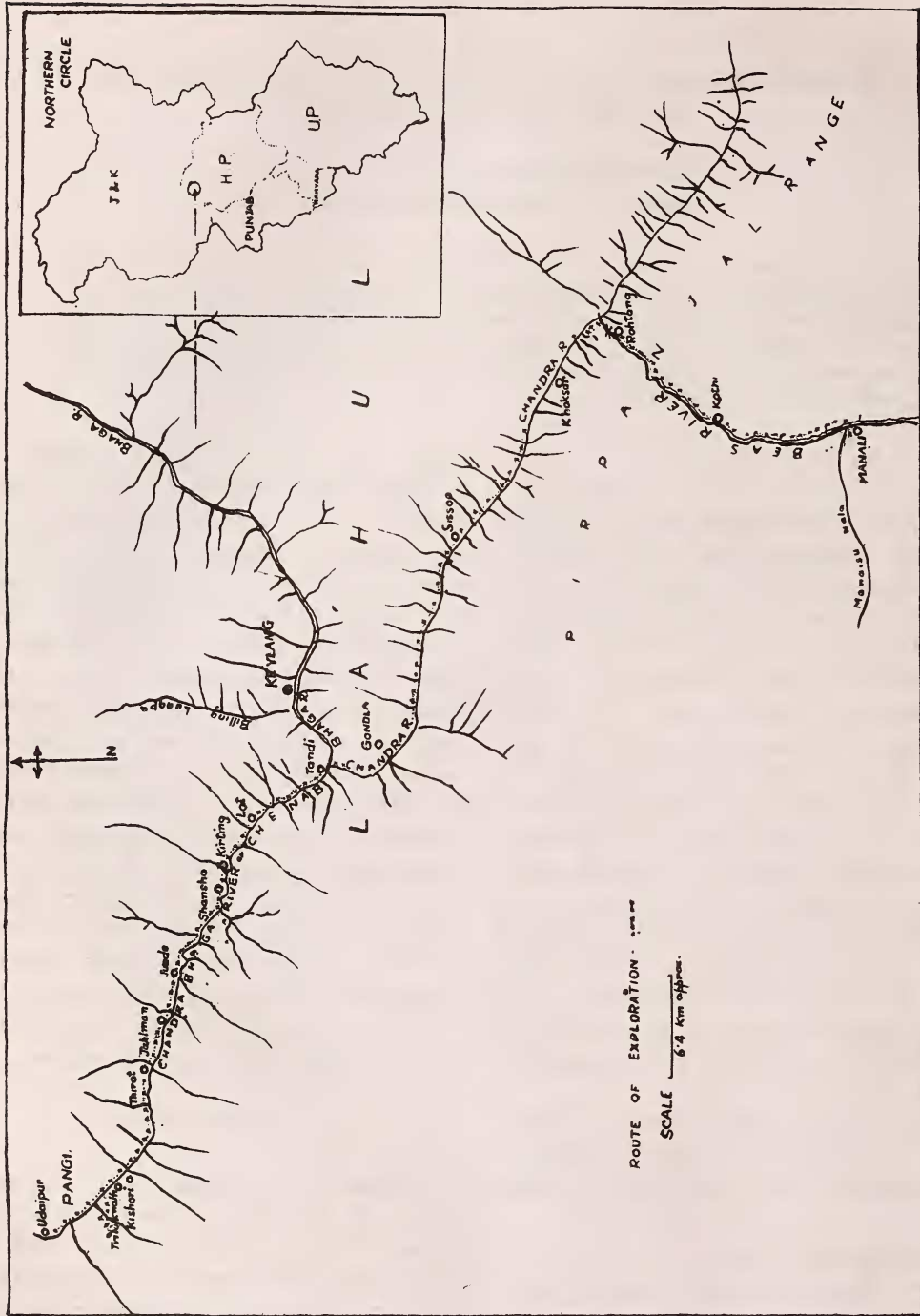


Fig. 1. Route map of the area explored.

buses are regularly plying to the close vicinity of Triloknath and people can reach the place without facing much difficulty. The small white temple of the shrine stands at the edge of a precipitous rock and the surrounding panorama from a distance reveals a pictorial view of the snowclad mountains in the background and a vast extension of the Chenab with large winding course disappearing into the great wilderness of the snowy heights. The mountain slopes facing north above Triloknath subtend beautiful forests of *Pinus wallichiana* and *Picea smithiana* up to the visible limit and end in complete barrenness predominated by a reddish carpet of *Polygonum affine* above 3500 m. On the farside of Triloknath the valley appears quite rugged with pale green *Juniperus polycarpous*, sparsely covering the eroded slopes. Down at the bottom, the colourful terraced fields of Kishori village are visible. The latter is thickly populated and serves as a base for people intending to pay a visit to the shrine.

A steep climb from the Kishori village through shades of salices, cultivated terraces, flowering meadows and extremely rugged slopes brings one to the relieving surroundings of Triloknath (2900 m). Towards the end of August the valley including Triloknath becomes quite warm. Every year during this period people from remote places gather for a fair at Triloknath in colourful dresses and caps feathered with winged seeds of *Oroxylum indicum*. They dance for hours together in simple rhythmic steps to the monotonous music of a drum and a flute.

APPROACH AND PHYSIOGRAPHY

Before Manali — Leh High-Way was constructed people could enter the Lahul valley with great difficulty after crossing the formidable Rohtang Pass (3980 m). The fearful-

ness of the journey can be traced in one of the travel accounts to these areas (Borradaile 1928). At present people can cross Rohtang by bus and reach most of parts of Lahul including the Chenab valley up to Udaipur within a day from Manali, provided natural disasters do not occur.

The picturesque Lahul valley is surrounded on all sides by soaring mountains to which the easiest approach is through this pass. The whole topography within Lahul changes when the pass is crossed with a view of bleak, sunny gigantic ranges, snow clad peaks and massive glaciers. An endless descent begins from Rohtang towards the Chandra river basin to reach Koksar along the furiously windy Rohtang slope. The road crosses the Chandra at Koksar and follows the course of the river along its northern bank with a smooth course up to Sissoo. Beyond Sissoo and up to Gondla the journey continues through extremely dry bleak mountains where dwarf form of *Scabiosa speciosa* and *Nepeta eriostachya* dominate as survivors after August. A splash of green is seen wherever there is a source of stream or the slopes are artificially irrigated. Beyond Gondla the motor road descends again to the basin of the Chandra river and runs almost parallel through extremely loose and vertical slope where *Heracleum thomsoni* is a successful straggler. The river Chandra ultimately ends with a northerly course and joins the river Bhaga near Tandi.

Chenab or Chandra-Bhaga is practically the only outlet of the massive glaciated valleys of Lahul. The whole water reserve of the vast triangular glacial system of the central Himalayan ranges enclosed within the Lahul valley is drained out by two rivers of Lahul namely Chandra and Bhaga originating from the mountains situated at the northern extremities of the district at Baralacha La and encircles

the glaciated region on all sides till it comes out to form a joint flow through an outlet at Tandi. The combined flow with the name Chandra-Bhaga or Chenab takes its course towards northwest through Lahul up to Thiroit and then enters into Pangi subtehsil of Chamba (at present within Lahul) and ultimately flows through Kishtwar and Jammu till it emerges in Pakistan. Entrance to the upper Chenab valley through Kishtwar is not easy due to difficult terrain and un-inhabited areas of the valley in Pangi. People intending to pay a visit to Triloknath after seeing the shrine of Manimahesh in Chamba often venture to enter the upper Chenab near Shansha. But it is also a difficult route through high altitude passes and desolate areas.

From its origin near Tandi the Chenab has made its course through a narrow valley and has widened considerably at certain places like Shansha, Jahlman and Udaipur helping the development of well populated localities with flourishing cultivation. The steep mountains of Gneissic rock along the southern bank of Chenab extend as far as the border of Chamba giving a dark brown or greyish look.

The western boundary of Lahul was previously delimited by Thiroit Nala and from here the southern vertical rock faces become more gradual together with the lowering of height and density of *Pinus wallichiana* in association with *Picea smithiana* increases up to Triloknath. The northern slopes of the valley on the other hand show a complete barrenness in the upper reaches and vast extension of blunt crests and troughs make the typical topography of Lahul without any tree vegetation up to Kirting. However, the picture in the basin is very different where planted Salices and cultivated fields present a beautiful colour scheme with Potato, Buckwheat, Barley and vegetable cultivation.

The mountains on the northern part of the valley are mainly composed of sedimentary deposits of clay and silt and show the forceful action of glaciation and erosion with more or less uniform dryness throughout the valley. This sunny topography is particularly dominated by *Juniperus polycarpus* (*J. macropoda*) after 16 kms from Tandi and remains uncontested by any other conifer. Apart from the massive drainage of the turbulent flow of the river several other congenial factors have changed the face of the upper Chenab both within Lahul and Pangi influencing its vegetational pattern and also by showing a remarkable demarcating zone for Lahul and Pangi along the valley.

In addition to its comparatively low altitude ranging between 2600-2900 m the valley has a good number of perennial and turbulent tributaries of Chenab between Tandi and Udaipur which are chiefly responsible for rendering the valley more hospitable and greener. The most important climatic condition which has kept the valley more moist is the absence of typical desiccating dry and chilly wind of the Chandra valley. This characteristic furious wind of easterly origin is obstructed by the high snowclad peaks at the mouth of the Chenab and is diverted towards the Bhaga valley along the upper reaches of the north facing slopes above Kardong rendering the farside of Keylang almost barren leaving only bushy *Juniperus communis*. A few stunted trees of *Pinus wallichiana* visible from Keylang are already a victim of this wind.

BOTANICAL HISTORY

The earliest information about the Botany of Lahul valley is known through the comprehensive account of plants, vegetable products and authentic records published by

Aitchison (l.c.) based mainly on Jaeschke's and his own collection gathered from within the political boundary of Lahul including the upper Chenab up to Thirot. But the account does not reveal the more interesting nature of vegetation beyond Thirot and further down along the valley in Pangli. With the establishment of better communication facilities many new plants to the existing list have been subsequently added. After Aitchison, the flora of Lahul is described in a short account by Watt (1881). He made a general collection from the upper Chenab and added information to the botanical knowledge of the valley. Later plants have been gathered from Lahul by well known collectors like Lace, Koelz, Stewart and others with their collections scattered in different herbaria of the world.

During the present century most extensive collections have been gathered by late N. L. Bor from Lahul during 1941-42 and are preserved in the Forest Research Institute Herbarium (DD.) His collections specially along Billing Nala (Billing Lungpa) are highly interesting. Koelz's collections are also very extensive from Lahul but excepting some stray gatherings very little material is available from the upper Chenab. Joshi (1952) presented a short account of the aquatic flora of Lahul and included few important plants of aquatic and moist habitat. Sethi and Negi from FRI also paid a visit in Lahul during 1958 and gathered a good collection from upper Chenab.

From Northern Circle of the Botanical Survey of India collections from Lahul and Spiti valleys have been gathered during the sixties by Rau (1960) and Nair (1964) but the area under present report remained uncovered during those visits. Recently some account of exploration and new records from the Lahul valley have been of additional information. (Kapahi & Sarin 1979 and Aswal

& Mehrotra 1970). The present account is based only on the exploration conducted along the upper Chenab from Tandri to Udaipur a distance of about 50 km including the environs of Triloknath on the way.

GENERAL VEGETATION AND BOTANY OF THE ROUTE

The vegetation of this inner valley is characterised by a combination of a comparatively lush flora represented by the dry and wet Himalayan elements of both Lahul and Pangli. The explored area of the valley may be broadly divided into three sections comprising the initial dry and bleak zone from Tandri and westward about 10 km, the central well vegetated part between Kirting and Thirot and the typical flora of Pangli between Thirot to Udaipur. Towards the ultimate western part the infiltration of the characteristic wet Himalayan flora becomes apparent with the advent of exclusive stands of *Cedrus deodara* beyond Triloknath.

Tandri from where the Chenab begins is a small village situated at an altitude of 2900 m at the confluence of Chandra and Bhaga. The precipitous rocks on the farside at the beginning show a restricted growth of *Pinus wallichiana* and *Betula* sp. and largely planted *Salices* are the only tree vegetation around Tandri. However, on sheltered sandy slopes some characteristic plants like *Heracleum thomsoni* with stiff projecting flowering branches, yellow flowered *Galium verum* and *Heteropappus holoharmaphroditus* are common. The most interesting plant of the Chandra valley is the cream flowered *Saussurea jacea* forming green patches on the west facing slopes near Tandri. On eroded slopes and cuttings *Astragalus bicuspis*, *A. subumbellatus*, *Androsace rotundifolia*, *Leptorhabdos*

parviflora, *Ribes alpestre*, *Hyoscyamus niger*, *Cotoneaster falconeri*, *Scorzonera divaricata* occur. Scattered bushes of *Rosa webbiana* are fairly common on dry open slopes. From Tandi the motor road climbs up towards Kirting along the higher reaches of the south facing slopes. *Artemisia maritima*, *Nepeta eriostachya* with occasional bushes of *Astragalus bicuspis* and *Rosa webbiana* are seen on the slopes. Occasional bushes of *Berberis jaeschkeana* also occur in *Salix* groves.

The southern part of the Chenab stands as a sheer wall for more than 20 kms from Tandi westward except at places where it has been interrupted by gullies, rivers or slanting morain deposits. A sparse growth of *Pinus wallichiana* and *Picea smithiana* on the steep rock is replaced by dense forest beyond Kirting of *Juniperus communis* and *Salix denticulata*. The latter flourishes specially on shady troughs and moist gullies.

Kirting marks the first village from where the valley towards its west is remarkably green with plantations and natural vegetation. A torrent flowing through the village greatly influences its vegetation and along its course there is a lush growth of *Hippophae rhamnoides* var. *turkistanica* and *Salix oxycarpa*. The slopes hold growths of *Polygonum polystachyum*, *Impatiens gigantea*, *Cirsium wallichii*, *Datisca cannabina*, *Mentha longifolia*, *Aster indamellus*, *Epilobium angustifolium*, *Juncus himalensis*, *Plantago major*, *Parnassia ovata*, *Ranunculus hirtellus*, *Erigeron alpinus*, *Medicago lupulina* and *Plantago depressa*. The herbaceous and shrubby members specially on irrigated slopes and around cultivated fields offer a typical assemblage of *Nepeta spicata*, *Medicago sativa*, *Silene vulgaris*, *Senecio chrysanthemoides*, *Heracleum lanatum*, *Swertia cordata*, *Jaeschkea gentianoides*, *Pedicularis pectinata*, *Polygonum*

alpinum, and few others. Some of the characteristic herbaceous elements growing in the village along the canal banks are *Impatiens brachycentra*, *Elsholtzia ciliata*, *Chenopodium botrys* and *Cannabis indica*. Extensive areas of the valley are under Potato, Buckwheat and occasionally Barley and Wheat cultivation. Fruit trees like *Pyrus malus*, *Prunus armeniaca* have been planted but are mostly attacked by virus infection. Signs of similar infection are found to be spreading on introduced *Populus* also. A gentle slope extending from Shansha right to the margin of the Chenab harbours some typical plants like *Halerpestes tricuspis*, *Cyperus squarrosus*, *Calamagrostis pseudophragmites*, *Lotus corniculatus*, *Plantago major*, *Melilotus officinalis* and *Scirpus setaceus*. The area near the river bank is almost a sandy waste where apart from planted *Salix oxycarpa* the open areas hold *Hippophae rhamnoides*, *Myricaria germanica* with the twining *Polygonum dumetorum*. Comparatively drier marginal areas have *Dianthus angulatus*, *Polygonum paronychioides*, *P. tubulosum* together with occasional growths of *Heracleum thomsoni*, *Galium verum*, *Lindelia anchusoides* and *Astragalus amherstianus*. Unlike the complete barren look of the sunny slopes between Kirting and Tandi the south facing slopes around Shansha show a profuse growth of prickly bushes of *Rosa webbiana*, and *R. macrophylla*. At some places *R. foetida* is occasionally met with on hedges. Among herbaceous perennials pioneering on the slopes are *Artemisia maritima*, *A. dracunculoides*, *Origanum vulgare* and *Verbascum thapsus* and with the availability of water a lush growth of plants characteristic of Lahul makes its appearance.

The vegetation above 3000 m on the sunny aspect in the valley is very poor. This apparently barren and dry slopes have extensive

growth of *Cousinia thomsoni* between 3000-3600 m. Among boulders *Meconopsis aculeata* is not uncommon but it is mostly sterile due to grazing. The semicushion forming *Minuartia lineata* is the most successful survivor. Gentle troughs have a thick covering of *Iris kumaonensis* and *Taraxacum officinale*. Some of the interesting plants along dry gullies at lower elevation are *Scutellaria prostrata*, *Galium serpylloides*, *Sempervivella acuminata*, *Androsace rotundifolia*, *Astragalus bicuspis*, *Cotoneaster rotundifolius*.

Comparatively richer and denser vegetation on the north facing slopes of the Chenab is seen after crossing the torrential river about 4 km west of Kirting. A bridle path from the main road leads towards the basin of the valley and after crossing the river approaches the villages Rappe and Rasse on the other side. A journey to the upper reaches alongside glacial fed streams offers congenial habitats for a number of uncommon plants not seen on the sunny slopes of the valley. Some of these are *Hyssopus officinalis* with pretty purplish blue spikes and strong aroma, *Anaphalis stoliczkai* forming graceful clumps, and *Pimpinella diversifolia*, *Senecio pedunculatus* f. *alba* (nov.). Their vertical distribution hardly extends more than 50 m from the level of the river water. There is a rich herbaceous growth composed of *Medicago sativa*, *Polygonum alpinum*, *Thalictrum minus*, *Jaeschkea gentianoides*, *Heracleum lanatum*, *Silene vulgaris*, *Swertia cordata*, *Nepeta spicata*, *Pedicularis pectinata*, *Senecio chrysanthemoides*, *Dactylis glomerata* and a few others near the village of Rappe. Dense thickets of thorny *Hippophae rhamnoides* var. *turkistanica* flourish on the slopes at a lower elevation.

A steep foot track from the neighbouring village Rasse climbs upwards to provide an easy route to reach the thick forest of *Pinus*

wallichiana on the north facing slopes of the valley and people intending to visit Triloknath from Manimahesh go along this path. Through a vast slope of moraine deposits the winding path gradually attains height. The slope is strewn with handsome clumps of *Stipa sibirica* and some interesting species like *Heracleum thomsoni*, *Galium verum*, *Anemone rupicola*, and *Oxytropis thomsoni*. Herbaceous species like *Impatiens thomsoni*, *Oxyria digyna*, *Epilobium alpinum*, *Crepis multicaulis*, *Gnaphalium thomsoni*, *Taraxacum officinale* are also seen where the moraine is moist. A little higher up on a slushy rock large number of white flowering clumps of *Silene persica* and yellow flowered *Potentilla curviseta* occur.

Up to this part of the Chenab valley the ultimate tree limit consists of a pure growth of *Pinus wallichiana* and is associated with *Juniperus communis*, *Lonicera obovata*, *Syringa emodi*, *Viburnum cotinifolium* and *Salix denticulata* as dominating undergrowth. The *Salix* gives a thick coverage specially along moist shady gullies. On dry shady slopes *Ephedra gerardiana*, *Bergenia stracheyi*, *Potentilla curviseta*, and *Polygonum affine* are the main herbs at higher reaches and on dry cliffs a few bushes of *Potentilla salessoviana* occur rarely. Above 3300 m the dry and shady rocks and slopes hold mainly *Ephedra gerardiana*, *Bergenia stracheyi*, *Potentilla curviseta* and *Polygonum affine*. A beautiful field of *Stipa sibirica* is seen on a vast west facing gentle slope. The grass is locally known as "Bohari" and is largely exploited for the panicles, which are used for making brooms.

The journey from Kirting, to Jahlman does not offer any appreciable change in the composition of the vegetation on either side of the Chenab and thick plantations of *Salix oxycarpa* alongside the road provide greenery within the village. Thickets of *Rosa webbiana*, *Rosa*

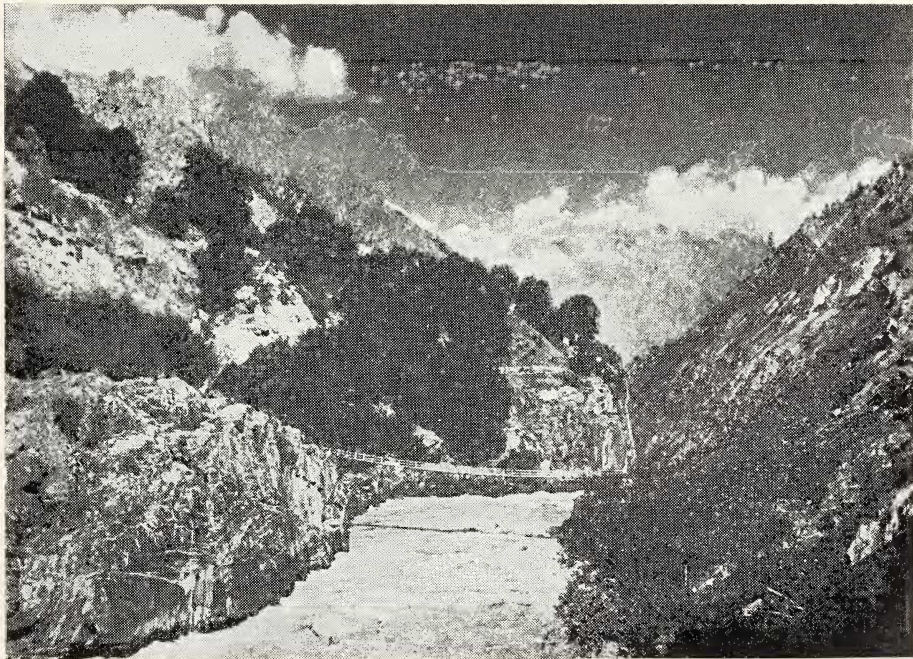
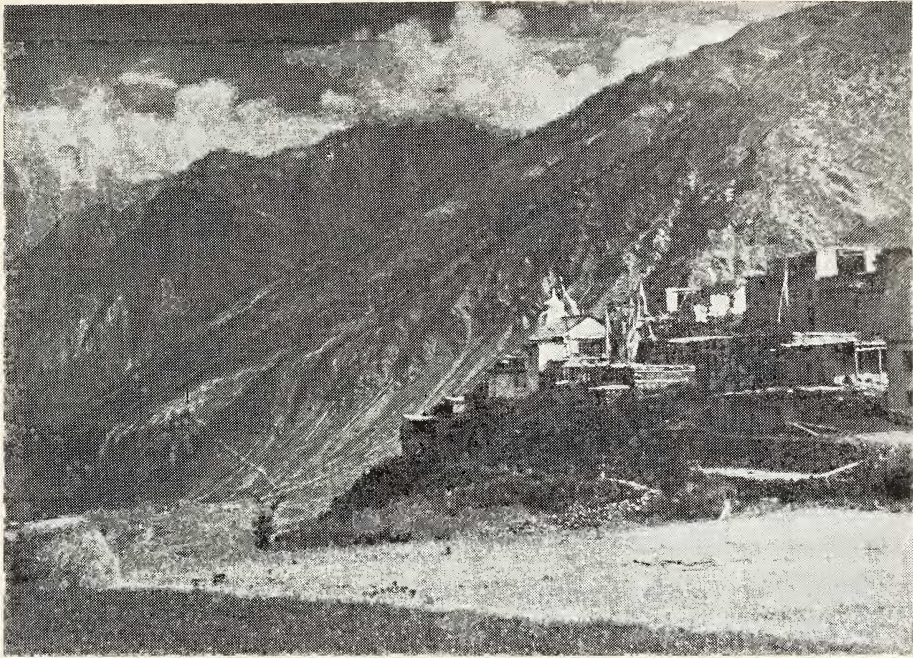
macrophylla associated with *Artemisia maritima* extend over large areas on dry south facing slopes on way to Jahlman. The valley at Jahlman widens and the gentle slopes provide facilities for extensive terraced cultivation by artificial irrigation.

After the bleakness of the higher reaches at Tandi, the common dry Himalayan *Juniperus polycarpus* appears again in a stunted form from Junde. Elegant forests of this Juniper flourish between Kamring and Thirot but the trees are largely infected by *Arceuthobium oxycedri* in the vicinity of Thirot. The mimicry of this obligate parasite to the foliage of the host is almost perfect and it is not detected till its action becomes detrimental to the tree. It is likely to cause tremendous loss to this species, threatening its very existence in the whole of Lahul valley in the near future. Undergrowth in this forest is rather poor and *Artemisia maritima* is found to be the best survivor. Other herbaceous elements met in this forest are *Origanum vulgare*, *Artemisia dracunculoides*, *A. sacrorum*, *Thymus serpyllum*, *Chenopodium botrys*, *Malva pusilla*, *Scutellaria prostrata* and occasional bushes of *Rosa webbiana*. Near Kamring *Cymbopogon schoenanthus* is an interesting grass well represented in *Juniperus* undergrowth. In some of the forest clearings and dry gullies flourishing growths of *Sorbaria tomentosa* is a rarity for the Lahul valley. These are frequently infested with *Cuscuta reflexa*.

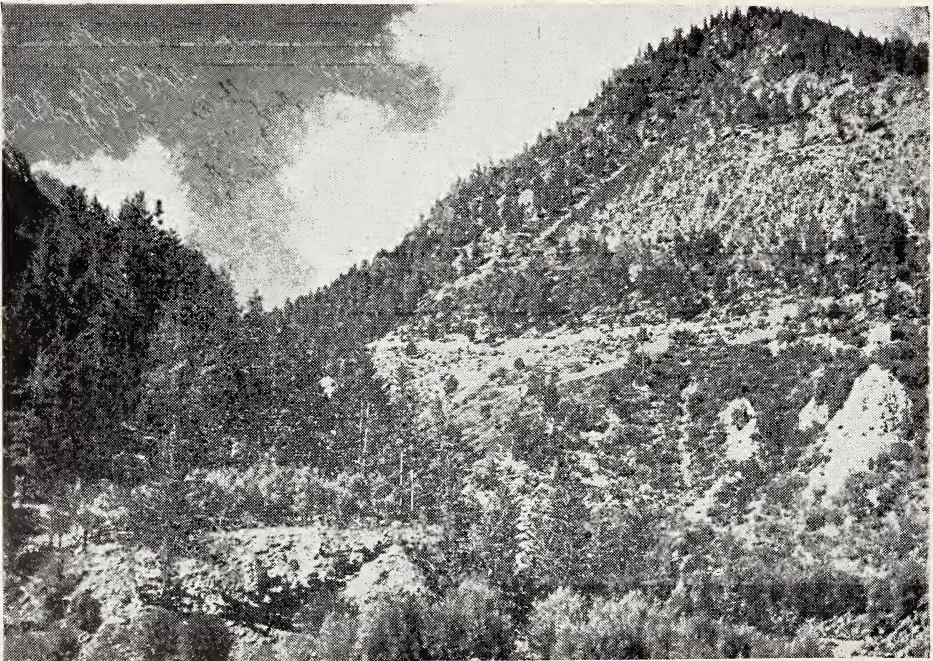
The administrative boundary of Pangi subdivision begins from Thirot. A turbulent tributary of Chenab known as Thirot Nala flows through the small village and the course preserves a similar plant community seen earlier at Kirting. Along with thickets of *Salix oxycarpa*, *Hippophae rhamnoides*, *Lonicera quinquelocularis*, *Viburnum cotinifolium*

near the basin, the herbaceous growth is enriched by *Pedicularis punctata*, *Impatiens thomsonii*, *Datisca cannabina*, *Ranunculus hirtellus*, *Aster indamellus* and a few others.

The most interesting features of vegetation in the main valley is the isolation of the floristic elements of Pangi by a demarcating boundary towards the eastern vicinity of Thirot. The shrubby members represent a typical composition in the valley and are dominated by *Fraxinus xanthoxyloides*, *Berberis pseudoumbellata*, *Rosa webbiana*, *R. macrophylla*, *Cotoneaster pangienensis*, *C. roseus* and *C. gilgitensis* close to the river basin. Upward distribution of the said species on the sunny slope extend to a limited height and cover the northern bank of the river uninterruptedly between Kamring and Udaipur. The journey on way to Triloknath from Thirot offers soothing landscape with a combination of *Pinus wallichiana* and *Picea smithiana* on the north facing slope and the motor road stretching westward passes almost at a parallel height with a gentle ascent. The slopes become more rocky and drier. Few huge and wild trees of *Juglans regia* form an impressive green patch within a kilometer from Thirot. Some of the typical members of Rosaceae like *Crataegus oxyacantha*, *Pyrus jacquemontii* are commonly associated with the scrubby elements noted earlier. Excepting in rarely moist situation the herbaceous members are poorly represented within the dry shrubby vegetation however, the common ones are *Artemisia maritima*, *A. sacrorum*, *Origanum vulgare*, *Rumex nepalensis*, *Pterotheca falconeri*, *Verbascum thapsus*, *Thymus serpyllum*, *Chenopodium botrys*, *Scrophularia koelzii*, *Datisca cannabina*, *Herniaria hirsuta* and few others. On dry cliffs *Seseli sibiricum* is a rarely collected strongly aromatic plant frequently come across but mostly they are inaccessible.



Above: Triloknath temple and sunny slope strewn with stunted *J. polycarpus* Koch.
Below: *Salix oxycarpa* Anders. at Kishori village below Triloknath.



Above: Natural forests of *Cedrus deodara* (Roxb.) G. Don at Pangi near Udaipur.

Below: Contrasting *Juniperus* and *Cedrus* on northern and southern slope respectively.

Spiraea canescens and *Solidago virga-aurea* are also common on rocky slopes.

From the main bus route a mule track branches downwards about two kilometres before Triloknath and approaches a suspension bridge over the Chenab. In addition to common shrubby vegetation *Plectranthus rugosus* and *Sorbaria tomentosa* infested with *Cuscuta reflexa* mark changing components on this route. On a moist slope elegant growth of *Impatiens roylei* and *Inula grandiflora* are interesting to come across. An impressive view of the unrivalled scenery appears from the suspension bridge while approaching the village at the foot of Triloknath. A steep climb through planted *Salix oxycarpa* begins from the bridge to the neighbouring Kishori village. Due to adequate irrigation facilities the small village maintains a considerable area under cultivation of common Potato and Buckwheat and in addition small plots containing wheat, barley and few vegetables are not uncommon. The vegetation around the village does not show any interesting feature except in pools along the shady river bank, where characteristic plants of aquatic habitats such as *Polygonum hydropiper* ssp. *megalocarpum*, *Eleocharis palustris*, *Limosella aquatica*, *Callitriche verna*, *Triglochin palustre* and *Halerpestes sarmentosa* occur. The moist slopes and waste lands around cultivated fields hold *Carum carvi*, *Corydalis ramosa*, *Dactylis glomerata*, *Geranium aconitifolium*, *Lamium amplexicaule*, *Lepyrodiclis holosteoides*, *Medicago sativa*, *Nepeta spicata*, *Senecio chrysanthemoides*, *Swertia cordata*, *Trifolium repens*, *Urtica dioica*, *Veronica persica* etc. A lush and interesting vegetation is seen on the north bank of the Chenab near the village. Due to low height (2400 m) of the valley here, several wet and semidry habitat Himalayan plants like *Salvia nubicola*, *Sium latijugum*, *Campa-*

nula latifolia, *Codonopsis rotundifolia*, *Lespedeza juncea*, *Medicago lupulina*, *Nepeta linearis*, *Elscholtzia ciliata*, *Bothriochloa ischaemum*, *Phragmites australis*, *Allium rubellum*, *A. strachyi*, *Jurinea ceratocarpa*, *Leibnitzia nepalensis* etc. present a characteristic vegetation on the shady river bank.

A journey to Triloknath proper from Kishori village begins through an irrigated pasture and then a rugged dry rocky slope with a steep ascent till the plateau is reached. Excepting a thin scrubby growth of *Rosa webbiana*, *Prunus jacquemontii*, *Fraxinus xanthoxyloides* accompanied by few interesting plants like *Heteropappus altaicus*, *Dianthus angulatus*, *Physochlaina paraealta*, *Rubia cordifolia* etc. the route beyond the village does not sustain notable plants. On the other hand the vegetation becomes more interesting while climbing the slopes above Triloknath to reach the thick forest of *Pinus wallichiana* and *Picea smithiana*. The moist irrigated north facing slopes have *Angelica glauca*, *Anaphalis cuneifolia*, *Astragalus himalayanus*, *Bupleurum jucundum*, *B. falcatum*, *Galium boreale*, *Pedicularis pectinata*, *Polygonum alpinum*, *P. polystachyum*, *P. nepalense*, *P. hydropiper*, *Corydalis ramosa*, *Valeriana hardwickii*, *Orchis latifolia*, *Herminium monorchis*, *Polygonatum geminiflorum*, *Phlomis bracteosa* and others.

An exploratory trip along the adjoining valley of Hinsia Nala up to the limit of the glacial moraine through the *Pinus-Picea* forest was fascinating. The extension of the narrow valley of the stream does not show a rich herbaceous growth. A few shrubs of *Syringa emodi*, *Viburnum cotinifolium*, *Ribes alpestre*, *Rubus irritans*, *Berberis pachycantha*, *Sorbus aucuparia* are come across. Before the termination of the stream at the moraine deposits the thickness of the *Pinus-Picea* forest declines and ultimately the slopes

support prostrate bushes of *Juniperus communis* only. The sheltered slopes supported *Polygonum affine* and *Bergenia stracheyi* on rocks. At higher reaches *Ephedra gerardiana* is also found to flourish on shady rock. The slopes towards the bottom of the valley appears to be quite bleak and *Nepeta discolor*, *Taraxacum officinale*, *Leontopodium alpinum*, *Galium serpylloides* together with few ferns like *Asplenium trichomanes*, *A. septentrionale* and *Pellaea gracilis* are met with.

The Chenab valley widens considerably towards west of Triloknath near Udaipur and a remarkable change in the tree vegetation is noted by the appearance of *Cedrus deodara* on both sides of the valley. A high rate of natural regeneration becomes evident by their extensive distribution on the slopes as well as on the river bed and adjoining plains. In the undergrowth and on barren slopes the dominant plants are *Artemisia maritima* and *Juniperus communis*. The latter, however, is more on open slopes facing north. The dry open slopes when devoid of any tree growth is covered mainly by *Artemisia maritima*. There is a marked stuntedness of *Juniperus polycarpus* on way to Udaipur from Triloknath and similarly the general shrubby vegetation on the sunny part, represented by *Fraxinus*, *Cotoneaster*, *Berberis*, *Ribes* and *Rosa* are also much dwarfed in habit. On river banks and slopes a few uncommon plants are come across namely *Echinops cornigerus*, *Scrophularia scabiosaefolia*, *Hypericum perforatum*, *Erianthus ravennae*. Excepting the handsome Cedars the area around Udaipur has poor vegetation and a few planted trees give a monotonous landscape to the village represented by *Populus alba*, *Salix oxycarpa*, *Juglans regia*, *Prunus armeniaca* etc.

A list of plants gathered during the trip

are enumerated with short field notes and all the collection numbers are deposited at BSD under the senior author's name. As the period of collection is restricted to 12th to 23rd August, 1971, the date of collection has not been specifically mentioned. As far as practicable the nomenclature of plants have been brought up to date. Plants not recorded earlier are marked with an asterisk.

DICOTYLEDONS
RANUNCULACEAE

Anemone rupicola Camb.

On north facing dry slope, flowers white.
Rasse 3000 m, 45343.

Halerpestes sarmentosa (Adams) Komarov

On moist soil and shady pools, flowers yellow.

Shansha 2800 m, 45253; Kishori 2400 m, 45992.

Ranunculus hirtellus Royle

On moist shady slope, flowers yellow.
Kirting 2900 m, 45289.

R. hyperboreus Rottb.

On slushy slope, flowers yellow.
Rasse 3200 m, 45327.

Thalictrum minus Linn. var. **foetida** (Linn.)

Hook. f. & Thoms.

On west facing moist slope. In fruit.
Roding 3000 m, 45309.

BERBERIDACEAE

Berberis jaeschkeana Schneid.

Under shade of salices. Fruits green.
Lot 3200 m, 40704.

B. pachyacantha Koehne

On shady slope within Picea- Pinus forest.
Fruits reddish green.

Triloknath, Hinsu Nala 3200 m, 45911.

B. pseudumbellata Parker

On south facing dry slope. Fruits pruinose blue.

Thirot 2600 m, 45359.

FUMARIACEAE

Corydalis ramosa Wall. ex Hook. f. & Thoms.

Along north facing gully, flowers yellow.

Triloknath 2900 m, 45904.

BRASSICACEAE (CRUCIFERAE)

Brassica napus Linn.

Occasionally cultivated.

Rappe 2600 m, 45334.

Descurainia sophia (Linn.) Webb. ex Prantl.

On roof of houses, flowers yellow.

Kishori 2400 m, 45382.

Thlaspi arvense Linn.

Weed in Potato field, flowers white, fruits orbicular.

Triloknath 2900 m, 45396.

CARYOPHYLLACEAE

Arenaria serpyllifolia Linn.

On dry south facing slope, Fruiting cymes.

Rappe 2600 m, 45331.

Cerastium glomeratum Thuill.

On moist shady slope, flowers white.

Thirot 2600 m, 45379.

Dianthus angulatus Royle

On dry river bed and stony slope, flowers pink and white.

Shansha 2800 m, 45265; Triloknath 2800 m, 45924.

* **Herniaria hirsuta** Linn.

On shady soil, flowers and fruits minute.

Thirot 2600 m, 45369; Udaipur 2400 m, 45942.

* **Lepyrodiclis holosteoides** Fenzl. ex Fisch. et Mey.

A weed in cultivated field, flowers white.

Shansha 2800 m, 45241; Triloknath 2700 m, 45927.

Sagina saginoides (Linn.) Karsten

On moist shady soil, flowers green.

Thirot 2600 m, 45371.

Silene persica Boiss. ssp. **moorcroftiana**

(Rohrb.) Chaudhuri

On moist rock and shady slopes, flowers white, purple beneath.

Rasse 3200 m, 45320; Triloknath 3000 m, 45998.

S. vulgaris (Moench.) Garcke

On moist irrigated slopes, flowers white.

Shansha 2800 m, 45280.

Stellaria media (Linn.) Vill.

On shady slopes, flowers white.

Kirting 2900 m, 45293.

TAMARICACEAE

Myricaria germanica (Linn.) Desv.

On sandy river-bed. Fruiting spikes present.

Shansha 2800 m, 45236.

GUTTIFERAE (HYPERICACEAE)

* **Hypericum perforatum** Linn.

On dry rocky slopes, flowers yellow.

Thirot 2600 m, 45350; Triloknath 2800 m, 45951.

MALVACEAE

Malva pusilla Sm.

On waste land around villages.

Kirting 2900 m, 45241; Kishori 2400 m, 45999.

GERANIACEAE

* **Geranium aconitifolium** L'Herit

On moist north facing slopes, flowers showy purple.

Kishori 2400 m, 45974.

G. nepalense Sw.

On shady slopes, flowers pale pink.
Kirting 2900 m, 45244.

* **Erodium stephanianum Willd.**

On north facing stony slopes, flowers pink.
Triloknath 2600 m, 45994.

BALSAMINACEAE

* **Impatiens brachycentra Kar. et Kir.**

On shady, moist, slopes, flowers small pinkish white.
Thirot 2600 m, 45383.

CELASTRACEAE

* **Euonymus fimbriatus Wall. ex Roxb.**

On open rocky areas. In fruit. Rare.
Thirot 2600 m, 45884.

RHAMNACEAE

* **Rhamnus prostrata Jacq. ex Parker**

On dry cliffs. In fruit.
Kirting 3500 m, 45316.

PAPILIONACEAE

Astragalus amherstianus Benth.

On dry sandy river beds. In fruit.
Shansha 2800 m, 45263.

A. himalayanus Klotzsch

On moist irrigated slope, flowers purple.
Kishori 2400 m, 45903.

Lens culinaris Medic.

In waste land cultivated field. In fruit.
Kirting 2800 m, 45250.

* **Lespedeza juncea (Linn. f.) Pers.**

On dry gentle slopes, flowers white.
Udaipur 2400 m, 45941.

Lotus corniculatus Linn.

On moist irrigated plains, flowers yellow and orange.
Shansha 2800 m, 45238.

Medicago lupulina Linn.

In shady wastelands, flowers yellow, fruits black.

Kishori 2400 m, 41298.

M. sativa Linn.

On moist irrigated slopes, flowers yellow.
Kishori 2400 m, 45997.

* **Melilotus alba Medic.**

On open irrigated slopes, flowers white.
Roding 3000 m, 45311.

* **M. officinalis (Linn.) Pallas**

In open irrigated plains, flowers yellow.
Shansha 2800 m, 45240; Kishori 2400 m.

Oxytropis thomsoni Benth. ex Baker

On dry slopes, flowers purple.

Roding 3000 m, 45314; Rasse 3000 m, 45322

ROSACEAE

* **Crataegus oxyacantha Linn.**

On dry open stony slopes, fruits red.

Thirot 2600 m, 45364; Kishori 2400 m, 45948.

Fragaria vesca Linn.

On shady slopes, flowers white.

Kishori 2400 m, 45982.

Potentilla argyrophylla Wall. var. leucochroa Hook. f.

On glacial scree, flowers yellow.

Rasse 2900 m, 45347.

P. ambigua Camb.

On glacial scree, flowers yellow.

Rasse 2800 m, 45342.

Potentilla curviseta Hook. f.

On shady cliffs, flowers yellow.

Rasse 3600 m, 45340.

Potentilla salessoviana Steph.

On shady dry rocks. In fruit.

Rasse 3400 m, 45338.

* **Prunus jacquemontii Hook. f.**

On rocky slopes. Fruits red.

Triloknath 2800 m, 45934.

Pyrus baccata Linn.

On south facing dry slopes, fruits reddish green.

Thirot 2600 m, 45362.

Rosa foetida Herrm.

Along hedges, flowers yellow.

Shansha 2500 m, 45313.

R. macrophylla Lindl.

On open stony slopes, flowers pale pink.

Kirting 2800 m, 45293.

R. webbiana Wall. ex. Royle

On dry stony slopes, flowers pink.

Shansha 2800 m, 45333.

Rubus irritans Focke

On shady slopes with *Picea* forming large patches, fruits orange.

Hinsa Nala 3000 m, 45910.

* **Sorbaria tomentosa** (Lindl.) Rehder

Along narrow gullies facing south, fruits in brown panicle.

Thirot 2600 m, 45360.

Sorbus aucuparia Linn.

On shady slope in *Picea* forest, fruits white.

Triloknath 2900 m, 45908.

Spiraea canescens D. Don

On open stony slopes, flowers white.

Thirot 2600 m, 45348; 45354.

PARNASSIACEAE

Parnassia ovata Ledeb.

On moist shady slopes, flowers white.

Kirting 3000 m, 45290.

SAXIFRAGACEAE

Saxifraga sibirica Linn.

Under shade of boulders, flowers white.

Kishori 2400 m, 45983.

GROSSULARIACEAE

Ribes alpestre Wall. ex Dcne.

On shady slopes in *Picea* forest, fruits

orange coloured.

Hinsa Nala 3200 m, 45908.

R. orientale Desf.

On slopes alongside turbulent stream, fruits yellow.

Thirot 2600 m, 45372.

CALLITRICHACEAE (HALORAGIDACEAE)

* **Callitriche verna** Linn.

In shallow pools, flowers minute green.

Kishori 2400 m, 45959.

CRASSULACEAE

Sedum acuminatum R. Hamet

Along dry stony gullies, flowers white.

Roding 3000 m, 45297.

ONAGRACEAE

* **Epilobium brevifolium** D. Don

On slushy stony areas, flowers pink.

Kirting 2900 m, 45284.

E. royleanum Haussk.

On moist stream beds, flowers pink.

Kirting 2900 m, 45287.

CUCURBITACEAE

* **Bryonia dioica** Jacq.

On hedges in waste lands, flowers & fruits green.

Triloknath 2800 m, 45931.

DATISCAEAE

* **Datisca cannabina** Linn.

On sandy slope along gullies and always on sunny part of the valley. Flowers dioecious pale green.

APIACEAE (UMBELLIFERAE)

- * **Angelica glauca** Edgew.
On north facing irrigated slope, fruits large winged.
Triloknath 2900 m, 45905.
- Bupleurum falcatum** Linn. var. **marginatum** (Wall. ex DC.) C. B. Clarke.
On moist north facing slope, flowers yellow.
Triloknath 2900 m, 45916.
- B. jucundum** Kurz
On moist irrigated slope, flowers yellow.
Triloknath 2900 m, 45913.
- Carum carvi** Linn.
On moist shady slope, flowers white.
Triloknath 2700 m, 45975.
- Ferula jaeschkeana** Vatke
On dry slopes, fruits large purple.
Roding 3000 m, 45310.
- * **Heracleum thomsoni** C. B. Clarke
On sandy riverbed, flowers white.
Shansha 2800 m, 45267.
- * **Pimpinella diversifolia** DC.
On moist slopes along river bank, flowers white.
Rappe 2800 m, 45325.
- * **Seseli sibiricum** (Linn.) Boiss.
On steep dry rock, flowers white. Pungently aromatic, not collected earlier, during this century.
Thirot 2600 m, 45387.
- * **Sium latijugum** C. B. Clarke
Along irrigation canal in shade, flowers white.
Hinsa 2400 m, 45939.

CAPRIFOLIACEAE

- Lonicera heterophylla** Dcne.
On banks of a turbulent streams, fruits red.
Thirot 2650 m, 45378.

- L. obovata** Royle ex Hook. f.
On shady north and west facing slopes, fruits blue.
Rasse 3400 m, 45335.
- L. quinquelocularis** Hardw.
On banks of turbulent streams, fruits green.
Kirting 2900 m, 45275.
- Viburnum cotinifolium** D. Don
On shady stream bank, fruits purple.
Thirot 2650 m, 45374.

RUBIACEAE

- Galium boreale** Linn.
On moist irrigated slopes, flowers white.
Triloknath 2900 m, 45925.
- G. serpylloides** Royle ex Hook. f.
On open stony slopes, fruits white, bristly.
Roding 3000 m, 45295; Hinsa Nala 3100 m, 45392.
- G. verum** Linn.
On dry sandy river bed, flowers yellow.
Shansha 2800 m, 45266.
- Rubia cordifolia** Linn.
On shady slopes, fruits black.
Kirting 2900 m, 45281; Triloknath 2700 m, 45923.

VALERIANACEAE

- Valeriana hardwickii** Wall.
On shady slopes, flowers white.
Kishori 2400 m, 45914.

ASTERACEAE (COMPOSITAE)

- Achillea millefolium** Linn.
On moist irrigated slopes, heads with yellow disk and white rays.
Shansha 2800 m, 45300.
- Anaphalis cuneifolia** Hook f.
On shady slopes, heads scarious white.
Triloknath 2900 m, 45922;

A. royleana DC.

In Pine forest undergrowth, heads scarious white.

Triloknath 2600 m, 45971.

A. stoliczkai C. B. Clarke

On river bank slopes along Chenab, heads white.

Rappe 2800 m, U.C.B. 45829.

Anthemis cotula Linn.

In shady waste lands around village, heads with white rays and yellow disc.

Shansha 2800 m, 45243.

Arctium lappa Linn.

In shady waste land, heads purple thin hooked spines.

Kishori 2600 m, 45967.

Artemisia maritima Linn.

On dry slopes, head cinereous.

Kirting 2900 m, 45251; Udaipur 2400 m. 45969.

A. nilagirica Pampanini.

On moist slope, heads brown.

Thirot 2650 m, 45361.

A. sacrorum Ledeb.

On dry shady rock, heads yellow.

Kishori 2600 m, 45970.

A. scoparia Waldst. et Kit.

On sandy river bed and fallow fields, heads greenish white.

Shansha 2800 m, 45229; Kishori 2600 m, 45980.

* **A. tournefortiana** Reichb.

On slopes alongside road, heads green in strict panicles.

Kamri 2900 m, 45302.

Aster indamellus Grierson

On shady slope along irrigation canal, heads white.

Kirting 2900 m, 45272.

Brachyactis umbrosa Benth.

In shady waste lands, heads yellow.

Shansha 2800 m, 45286.

Carduus nutans Linn.

On dry exposed soil slope, heads purple. Kirting 2900 m, 45268.

* **Cirsium wallichii** DC. var. **platylepis**

Hook. f.

On open slope, heads white.

Kirting 3600 m, 45319.

Cousinia thomsoni C. B. Clarke

On south facing dry slope, heads purple.

Abundant above 3400 m.

Roding 3000 m, 45306.

Crepis multicaulis Ledeb. ssp. **genuina** (Regel)

Babe.

On moist glacial morain, heads yellow.

Rasse 3400 m, U.C.B. 45341.

Echinops cornigerus DC.

On terraced open slope, heads spherical white.

Opposite Kishori 2400 m, 45949.

Erigeron alpinus Linn.

On shady slope, heads lilac.

Kirting 2900 m, 45279; Triloknath 2800 m, 45995.

* **E. canadensis** Linn.

In waste land alongside road, heads yellowish white.

Udaipur 2400 m, 45943.

* **Filago arvensis** Linn.

On moist open slope, heads white.

Triloknath 2700 m, 45928.

* **F. spathulata** Presl.

On shady slope, heads brownish white.

Shansha 2800 m, 45288.

* **Galinsoga parviflora** Cav.

Along shady gullies, disc yellow, rays white.

Thirot 2600 m, 45358.

* **Gnaphalium thomsoni** Hook f.

On moist morain slope, heads white.

Rasse 3500 m, 45324.

Heteropappus altaicus (Willd.) Novopokr. var. **altaicus**

On north facing stony slope, rays white disc yellow.

- Thirot 2650 m, 45367; Triloknath 2700 m, 45393.
- Imula grandiflora** Willd.
On slushy south facing slope, heads yellow.
Triloknath 2400 m, 45383.
- I. racemosa** Hook. f.
Stout, planted, medicinal herb, heads large yellow.
Kamring 26500 m, 45370.
- Jurinea cerotocarpa** (Dcne.) Benth.
On boulders containing soil, heads purplish white.
Kishori 2400 m, 45947.
- Lactuca sativa** Linn.
Cultivated, heads yellow.
Kishori 2650 m, 45938.
- * **Leibnitzia nepalensis** (Kunze) Kitamura.
On shady moist slope in *Picea* forest, with young heads.
Kishori east 2600 m, 45977.
- Saussurea albescens** (DC.) Hook. f. & Thoms.
On open irrigated slope, heads white.
Roding 3000 m, 45301.
- S. jacea** (Klotzsch) C. B. Clarke
On loose eroded slope, heads cream white.
Tandi 2900 m, 45132.
- Senecio chrysanthemoides** DC.
On open irrigated slope, heads yellow.
Shansha 2800 m, 45282; Kishori 2600 m, 45968.
- Senecio pedunculatus** Edgew.
On shady soil slope, heads yellow.
Kishori 2500 m, 45984.
- S. pedunculatus** Edgew. var. **albus** nov.
On moist slope in shade on river bank, heads white.
Rappe 2600 m, 45329.
- Solidago virga-aurea** Linn.
On steep rock fissure, heads yellow.
Thirot 2600 m, 45349.

- Taraxacum officinale** Wigg.
On dry, stony, west facing, slope, heads yellow.

CAMPANULACEAE

- Campanula latifolia** Linn.
On shady slope. In fruit.
Kishori 2600 m, 45938.
- Codonopsis rotundifolia** Benth.
On shady slope. In fruit.
Kishori 2600 m, 45945.

PRIMULACEAE

- Androsace rotundifolia** Hardw.
On stony slope along gullies. In fruit.
Roding 3000 m, 45304.

OLEACEAE

- Fraxinus xanthoxyloides** Wall. ex DC.
Most common shrub on dry south facing slope, near river basin, fruits winged in attractive fascicles.
Thirot 2000 m, 45353; Triloknath 2500 m, 45952.
- * **Jasminum humile** Linn.
On south facing submoist slope. In fruit, flowers yellow.
Thirot 2600 m, 45365.
- Syringa emodi** Wall. ex D. Don
On shady slope. In fruit.
Hinsa Nala 300 m, 45907.

GENTIANACEAE

- Jaeschkea gentianoides** Kurz
On moist irrigated slope, corolla purplish white, inflated.
Rappe 2800 m, 45323.
- Swertia cordata** (G. Don) C. B. Clarke
On moist irrigated slope, flowers white.
Shansha 2800 m, 45247; Kishori 2600 m, 45926.

BORAGINACEAE

- Eritrichium fruticosum** Klotzsch
On shady stony slope, flowers blue.
Kishori 2600 m, 45964.
- Pseudomertensia echioides** (Benth.) Riedl.
On open rocky slope, flowers purplish blue.
Triloknath 3000 m, 45391.

SOLANACEAE

- Hyoscyamus niger** Linn.
In shady waste land flower dull yellow with purple network.
Shansha 2800 m, 45234.
- * **Nicotiana rustica** Linn.
In shady waste land, flowers pale green.
Shansha 2800 m, 45339.
- Physochlaina praealta** Miers
On rocky slope, flowers pale green.
Triloknath 2700 m, 45394.
- Solanum nigrum** Linn.
On rocky slope facing north, flowers white, fruits orange.
Triloknath 2800 m, 45932.
- S. tuberosum** Linn.
Cultivated, excessively flowering & fruiting.
Shansha 2800 m, 45345.

SCROPHULARIACEAE

- * **Euphrasia flabellata** Pennell
On moist irrigated slope, flowers white.
Kirting 3000 m, 45307.
- Euphrasia jaeschkei** Wettst.
On west facing semidry slope, flowers violet.
Rasse 3400 m, 45332.
- Limosella aquatica** Linn.
In fresh water pool, flowers minute, pale blue.
Kishori 2600 m, 45991.
- Pedicularis pectinata** Wall. ex Benth.
On irrigated shady slope. In fruit.
Triloknath 2900 m, 45915.

P. punctata Dcne.

- On moist open slope, flowers purple.
Thirot 2650 m, 45380.
- Scrophularia koelzii** Pennell
On dry south-facing slope, flowers pinkish white.
Opposite Kishori 2700 m, 45946.
- Veronica beccabunga** Linn.
Along shaded stream, flower pale blue.
Kirting 3000 m, 45315.
- V. persica** Poir.
On borders of cultivated field, flowers blue.
Kishori 2600 m, 45987.

LAMIACEAE (LABIATAE)

- Clinopodium umbrosum** (M.B.) C. Koch.
On moist irrigated slope, flowers pink.
Shansha 2800 m, 45283.
- Elsholtzia ciliata** (Thunb.) Hyland.
On shady slope, flowers white.
Kirting 2900 m, 45291, Kishori 2600 m, 45940.
- E. densa** Benth.
In cultivated field, flowers pink.
Shansha 2800 m, 45262; Triloknath 2800 m, 45920.
- * **Hyssopus officinalis** Linn.
On slopes along river, flowers purplish blue.
Rappe 2600 m, 45330; Kishori 2500 m, 45955.
- * **Mentha longifolia** (Linn.) Huds. var. **royleana** (Benth.) Raiz. et Saxena
Along water course, flowers pale pink.
Kirting 3000 m, 45277; Kishori 2600 m, 45953.
- Nepeta discolor** Royle ex Benth.
On west facing dry slopes, flowers blue.
Hinsa Nala 3200 m, 45400.
- N. linearis** Royle
On south facing stony slope, flowers pale pink.
Kishori 2600 m, 45950.

N. spicata Benth.

On borders of cultivated field, flowers blue.
Kishori 2600 m, 45972.

Origanum vulgare Linn.

On dry slopes, flowers white.
Shansha 2900 m, 45252.

Plectranthus rugosus Wall.

On open slopes along river, flowers white.
Kishori 2500 m, 45957.

Salvia nubicola Sweet

On shady moist slope, flowers yellow.
Kishori 2600 m, 45944.

Scutellaria prostrata Jacq. ex Benth.

On dry slopes, flowers yellowish white.
Kirting 2900 m, 45285; Thiroth 2600 m; 45389

* **Stachys sericea** Wall.

On moist irrigated slope, flowers pale pink.
Shansha 2800 m, 45245.

Thymus serpyllum Linn.

On cutting slopes, flowers white.
Kishori 2600 m, 45998.

* **Ajuga bracteosa** Wall. ex Benth.

In Pinus forest undergrowth, flowers white
Kishori east 2600 m, 45996.

PLANTAGINACEAE

* **Plantago asiatica** Linn.

On moist irrigated field, spikes green.
Shansha 2800 m, 45232.

Plantago depressa Willd.

On shady soil slope, spikes green.
Kirting 3000 m, 45296; Kishori 2600 m,
45973.

AMARANTHACEAE

Amaranthus hybridus Linn. ssp. **cruentus**
(Linn.) Thell.

Cultivated, panicle red or yellow.
Kishori east 2600 m, 46000.

CHENOPODIACEAE

Chenopodium album Linn.

In cultivated field, spikes green capitate.
Triloknath 2800 m, 45976.

C. botrys Linn.

Common, not collected.
Shansha 2800 m.

C. foliosum (Moench.) Aschrs.

In dry waste places, fruits red juicy.
Thiroth 2600 m, 45378.

* **C. hybridum** Linn.

In shady waste places, spikes green.
Shansha 2800 m, 45259.

POLYGONACEAE

* **Fagopyrum esculentum** Moench.

In shady waste places, flowers white.
Shansha 2800 m, 45239.

Oxyria digyna Hill.

On morain slope, flowers yellow, fruits red.
Hinsa Nala 3200 m, 45909.

Polygonum affine D. Don

On stony slope, spikes pink.
Triloknath, Hinsa Nala 3300 m, 45399.

P. alpinum All.

On north facing irrigated slope, flowers
white.
Triloknath, 2900 m, 45912.

P. aviculare Linn.

Under shade of *Salix*, flowers white.
Shansha 2800 m, 45230.

* **P. dumetorum** Linn.

Twining on *Hippophae*, flowers green, fruits
winged.
Shansha 2800 m, 45259.

* **P. glabrum** Willd.

On moist cultivated field, flowers pink.
Triloknath 2900 m, 45921.

P. glaciale Hook. f.

On submoist stony slope, flowers pale green.
Hinsa Nala 3200 m, 45390.

* **P. hydropiper** Linn. ssp. **megalocarpum**
Danser

In shallow water pools, flowers white.
Kishori 2600 m, 45963.

P. paronychioides C. A. Mey.

On dry sandy river bed, flowers pink.
Shansha 2800 m, 45261.

P. polystachyum Wall. ex Meissn.

On moist slope alongside stream, flowers white.
Kirting 2900 m, 45292.

* **P. tubulosum** Boiss.

On dry river bed and stony slopes, flowers pink.
Shansha 2800 m, 45260; Triloknath 3100 m, 45395.

P. viviparum Linn.

On moist irrigated slope, flowers white.
Triloknath 2900 m, 45929.

Rumex nepalensis Spreng.

Along irrigation canal, flowers green, fruits with hooked bristly wings.
Triloknath 2900 m, 45918.

ELAEAGNACEAE

Happophae rhamnoides Linn. subsp. **turkistanica** A. Rausi

Extremely common along gullies and moist slope, fruits yellow.
Kirting-Shansha 2800 m, 45257; 45270.

LORANTHACEAE

Arceuthobium oxycedri M. Bieb.

A common parasite on *Juniperus polycarpus* forming moss like fascicles. A heavily infected tree dies after a few years. There are indications of much damage to several standing trees. Infections are localised and not widespread in the valley.
Thirot 2600 m, 45351.

URTICACEAE

Parietaria debilis Forst.

Under shade of boulders, flowers minute pale green.
Kirting 2900 m, 45256.

Urtica dioica Linn.

On shady slope and along hedge, flowers pale green.
Kishori 2650 m, 45985.

CANNABIDACEAE

Cannabis sativa Linn.

In waste land around village, flowers white green.
Shansha 2800 m, 45248, 45249.

JUGLANDACEAE

Juglans regia Linn.

Gregarious on south facing submoist slope with fruits.
Thirot 2650 m, 45368.

SALICACEAE

Salix denticulata Anderss.

Along moist north facing gullies. In fruit, catkins.
Rasse 3400 m, 45337.

S. oxycarpa Anderss.

Along turbulent stream course. In fruit, catkins. Largely planted alongside road in villages.
Kirting 2900 m, 45271.

MONOCOTYLEDONS

ORCHIDACEAE

Herminium monorchis (Linn.) R. Br.

On moist irrigated slope, flowers green.
Triloknath 2900 m, 45930.

Orchis latifolia Linn.

On north facing moist irrigated slope. In fruit.

Triloknath 2900 m, 45917.

IRIDACEAE

Iris kumaonensis Wall. ex D. Don

Along shady moist gullies under planted salices, with fruits.

Kirting 3000 m, 45308.

LILIACEAE

Allium rubellum M. Bieb.

On stone slab along river bank, flowers purple.

Kishori 2600 m, 45936.

A. sativum Linn.

Occasionally cultivated, flowers white.

Roding 3000 m, 45294.

A. stracheyi Baker

On shady stone slab along river bank, flowers white.

Kishori 2600 m, 45935.

JUNCACEAE

Juncus bufonius Linn.

On moist shady slope, flowers green.

Kishori 2650 m, 45956.

J. himalensis Klotzsch

Along canals on shady slope, spikes brown.

Kirting 2900 m, 45275; Thiroth 2600 m, 45373.

J. lampocarpus Ehrh.

Along canals on shady slope, flowers green.

Thiroth 2650 m, 45375.

JUNCAGINACEAE

Triglochin palustre Linn.

On moist shady north-facing slope, with green fruits.

Triloknath, 2900 m, 45919.

CYPERACEAE

* **Cyperus squarrosus** Linn.

On moist irrigated plain, spikes green.

Shansha 2800 m, 45254.

Eleocharis palustris R. Br.

In shallow water, spikes white.

Kishori 2600 m, 45990.

Scirpus setaceus Linn.

On moist open field with brownish green spikes.

Shansha 2800 m, 45255; Kishori, 2600 m, 45954.

POACEAE (GRAMINEAE)

Agropyron canaliculatum Navski

On sandy river bank, spikes purplish green.

Shansha 2800 m, 45237.

Agrostis canina Linn.

On semidry open plain, spikes pale-brown.

Shansha 2800 m, 45233.

A. stolonifera Linn.

On moist sandy stream bed with purplish brown panicle.

Kirting 2900 m, 45276.

* **Arthraxon prionodes** (Steud.) Dandy

On dry stony slope, panicle purple.

Triloknath 2600 m, 45386.

Bothriochloa ischaemum (Linn.) Keng

Gregarious on north-facing slope, panicle purple.

Kishori 2600 m, 45979.

Bromus japonicus Thunb.

On sandy river bank, spikes purplish green.

Shansha 2800 m, 45231.

Calamagrostis pseudophragmites (Hall. f.)

Koeler

On moist sandy stream bed, panicle purplish green.

Kirting 2900 m, 45235; Thiroth 2650 m, 45355.